Claims

1. (Cancelled)

2. (Currently Amended) A Raman imaging fiberscope for the collection of white light images, Raman chemical images and Raman spectra from a sample comprising:

an outer jacket;

one or more white light illumination fibers, disposed in said outer jacket, for transmitting white light from a white light source to said sample;

one or more laser illumination fibers, disposed in said outer jacket, for transmitting laser light of a specific laser excitation wavelength from a laser source to said sample;

a coherent fiber bundle, disposed in said outer jacket, for transmitting a white light image of said sample and a Raman chemical image of said sample based on light scattered, reflected or emitted from said sample from one end of said fiber bundle proximate said sample to the opposite end of said fiber bundle distal said sample;

a laser bandpass filter positioned between said one or more laser illumination fibers and said sample for transmitting said laser light of said specific laser excitation wavelength and rejecting light of other wavelengths;

a laser rejection filter positioned between said sample and said coherent fiber bundle for transmitting wavelengths of light other than said specific laser excitation wavelength;

wherein said white light images, said Raman chemical images and said Raman spectra are all collected through said coherent fiber bundle; and

a spatial filter positioned between said sample and said coherent fiber bundle square to the axis of said coherent fiber bundle, for restricting the field of view of said coherent fiber bundle.

3. (Previously Amended) The Raman imaging fiberscope of claim 2 wherein said laser bandpass and said laser rejection filters exhibit a temperature dependant bandshift coefficient of about .005 nm per degree centigrade or less.

4. (Previously Amended) The Raman imaging fiberscope of claim 2 further comprising one or more lenses positioned between said sample and said coherent fiber bundle.

5. (Previously Amended) The Raman imaging fiberscope of claim 2 wherein said laser bandpass and said laser rejection filters are metal oxide dielectric filters.

6. (Previously Amended) The Raman imaging fiberscope of claim 2 further comprising an optically transparent window disposed at the end of said outer jacket proximate said sample.

7. (Previously Amended) The Raman imaging fiberscope of claim 6 wherein said window is composed of a material selected from a group comprising quartz, diamond and sapphire.

8. (Previously Amended) The fiberscope of claim 2 wherein said laser bandpass filter is spatially patterned into a first portion for filtering said laser light and a second, transparent portion.

9-17. (Cancelled)

18. (Previously Amended) The Raman imaging fiberscope of claim 2 further comprising:

a liquid crystal tunable filter imaging spectrometer coupled to the distal end of said coherent fiber bundle;

wherein said Raman chemical images are collected by tuning said liquid crystal tunable filter over a range of wavelengths and collecting images for each of said tuned wavelengths over a plurality of spatial locations on the surface of said sample, said spatial locations corresponding to individual fibers in said coherent fiber bundle.

19. (Cancelled)

20. (Previously Amended) The Raman imaging fiberscope of claim 18 further comprising a CCD camera, coupled to the output of said liquid crystal tunable filter imaging spectrometer, for viewing said Raman chemical images.

21. (Previously Amended) The Raman imaging fiberscope of claim 18 further comprising:

a video CCD; and

a video monitor for the viewing of white light images.

22. (Currently Amended) A Raman imaging fiberscope for the collection of white light images, Raman chemical images and Raman spectra from a sample comprising:

an outer jacket;

one or more white light illumination fibers, disposed in said outer jacket, for transmitting white light from a white light source to said sample;

one or more laser illumination fibers, disposed in said outer jacket, for transmitting laser light of a specific laser excitation wavelength from a laser source to said sample;

a coherent fiber bundle, disposed in said outer jacket, for transmitting a white light image of said sample and scattered Raman light from said sample;

a laser bandpass filter positioned between said one or more laser illumination fibers and said sample for transmitting said laser light of a specific laser excitation wavelength and rejecting light of other wavelengths;

a laser rejection filter positioned between said sample and said coherent fiber bundle for transmitting wavelengths of light other than said specific laser excitation wavelength; and

a liquid crystal tunable filter imaging spectrometer; and

a spatial filter positioned between said sample and said coherent fiber bundle square to the axis of said coherent fiber bundle, for restricting the field of view of said coherent fiber bundle.

23. (Previously Amended) The Raman imaging fiberscope of claim 22 further comprising:

a mount for holding said fiberscope in proximity to said sample;

a link for directing the output of said fiberscope under white light illumination conditions to a video CCD for viewing on a video monitor;

a link for directing the output of said fiberscope under laser illumination conditions to a Raman spectrometer; and

a link for directing the output of said fiberscope under laser illumination conditions to said liquid crystal tunable filter imaging spectrometer.

24. (Cancelled)

25. (Previously Amended) The Raman imaging fiberscope of claim 23 further comprising software and hardware for producing and displaying a Raman chemical image of said sample.

26. (Cancelled)

27. (Cancelled)

28. (Currently Amended) A Raman imaging fiberscope for collecting white light images, Raman chemical images and Raman spectra from a sample comprising:

one or more white light illumination fibers for transmitting white light from a white light source to said sample;

one or more laser illumination fibers for transmitting laser light of a specific laser excitation wavelength from a laser source to said sample;

a coherent fiber bundle;

a laser bandpass filter positioned between said one or more laser illumination fibers and said sample for transmitting said laser light of a specific laser excitation wavelength and rejecting light of other wavelengths;

a laser rejection filter positioned between said sample and said coherent fiber bundle for transmitting wavelengths of light other than said specific laser excitation wavelength; and

a spatial filter positioned between said sample and said coherent fiber bundle square to the axis of said coherent fiber bundle, for restricting the field of view of said coherent fiber bundle;

wherein said coherent fiber bundle transmits white light images, images composed of Raman scattered light and Raman spectra from a plurality of locations on the surface of said sample corresponding to individual fibers in said coherent fiber bundle.

29. (Previously Amended) The Raman imaging fiberscope of claim 28 wherein said laser bandpass and said laser rejection filters exhibit a temperature dependant bandshift coefficient of about .005 nm per degree centigrade or less.

30. (Previously Amended) The Raman imaging fiberscope of claim 28 further comprising one or more lenses positioned between said sample and said coherent fiber bundle.

31. (Previously Amended) The Raman imaging fiberscope of claim 28 further comprising an outer jacket for enclosing said fiberscope, said outer jacket containing said white light illumination fibers, said laser illumination fibers and said coherent fiber bundle.

32. (Previously Amended) The Raman imaging fiberscope of claim 31 further comprising an optically transparent window disposed at the end of said outer jacket.

33. (Previously Amended) The Raman imaging fiberscope of claim 32 wherein said window is composed of a material selected from a group comprising quartz, diamond and sapphire.

34. (Previously Amended) The Raman imaging fiberscope of claim 28 wherein said laser bandpass filter is spatially patterned into a first portion for filtering said laser light and a second, transparent portion.

35. (Previously Amended) The Raman imaging fiberscope of claim 28 wherein said laser bandpass and said laser rejection filters are metal oxide dielectric filters.

36-44. (Cancelled)

45. (Currently Amended) The Raman imaging fiberscope of claim 28 further comprising:

a mount for holding said fiberscope in proximity to said sample;

a link for directing the output of said fiberscope under white light illumination conditions to a video CCD for viewing on a video monitor;

a link for directing the output of said fiberscope under laser illumination conditions to a Raman spectrometer; and

a link for directing the output of said fiberscope under laser illumination conditions to [said] a liquid crystal tunable [filer] filter imaging spectrometer.

46. (Cancelled)

47. (Previously Amended) The Raman imaging fiberscope of claim 45 further comprising software and hardware for producing and displaying a Raman chemical image of said sample.

48. (Currently Amended) A Raman imaging fiberscope for collecting broadband images, Raman chemical images and Raman spectra from a sample comprising:

one or more white light illumination fibers for transmitting white light from a white light source to said sample;

one or more laser illumination fibers for transmitting laser light of a specific laser excitation wavelength from a laser source to said sample;

a coherent fiber bundle;

a laser bandpass filter positioned between said one or more laser illumination fibers and said sample for transmitting said laser light of a specific laser excitation wavelength and rejecting light of other wavelengths;

a laser rejection filter positioned between said sample and said coherent fiber bundle for transmitting wavelengths of light other than said specific laser excitation wavelength;

one or more lenses positioned between said sample and said coherent fiber bundle;

a spatial filter positioned between said sample and said coherent fiber bundle square to the axis of said coherent fiber bundle, for restricting the field of view of said coherent fiber bundle;

an outer jacket for enclosing the fiberscope; and

a window disposed at the end of said outer jacket.

48-51. (Cancelled)